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United States Government

Department of Energy

# memorandum

DATE: November 1, 2001

REPLY  
ATTN OF: EM-43

SUBJECT: Disposal Authorization for the Hanford Site Low-Level Waste Disposal Facilities – Revision 2

TO: Harry L. Boston, Manager, Office of River Protection  
Keith A. Klein, Manager, Richland Operations Office

The disposal authorization statement for the Hanford disposal facilities has been revised to reflect the Low-Level Waste Disposal Facility Federal Review Group (LFRG) review of the revised Hanford Immobilized Low-Activity Waste (ILAW) Performance Assessment (PA) dated March 2001, and to reflect closure of outstanding disposal authorization statement conditions for the 200 East Area Burial Grounds, the 200 West Area Burial Grounds, and the Environmental Restoration Disposal Facility (ERDF).

The revised disposal authorization statement has been revised to reflect closure of the following disposal authorization statement conditions:

- **Closure Plans** – The condition to submit closure plans has been closed. Closure plans for the 200 East Area Burial Grounds, the 200 West Area Burial Grounds have been written and approved by the Richland Operations Office on November 16, 2000. The Closure Plan for the ILAW disposal facility has been written and approved by the Office of River Protection on September 22, 2000.
- **Monitoring Plans** - The condition to submit monitoring plans has been closed. Monitoring plans for the 200 East Area Burial Grounds and the 200 West Area Burial Grounds have been written and approved by the Richland Operations Office on November 15, 2000. The monitoring plan for the ILAW disposal facility has been written and approved by the Office of River Protection on November 1, 2000.
- **PA and Composite Analysis (CA) Maintenance Plans** - The condition to submit maintenance plans has been closed. Maintenance plans for the 200 East Area Burial Grounds, and the 200 West Area Burial Grounds have been written and approved by the Richland Operations Office on March 22, 2000. The Maintenance plan for the ILAW disposal facility has been written and approved by the Office of River Protection on March 22, 2000.
- **200 East Area Burial Grounds and 200 West Area Burial Grounds PA Conditions** – Richland Operations Office documented the adequacy of waste characterization relative to the data needs of the 200 East Area Burial Grounds and 200 West Area Burial Grounds. On October 3, 2000, DOE agreed that this condition was met. The Richland Operations Office confirmed that the status of the disposal facilities has not changed since approval of the PA for the 200 East Area Burial Grounds and 200 West Area Burial Grounds. On July 17, 2000, the Richland Operations Office provided a memorandum confirming the status of the facilities as unchanged since the PA.

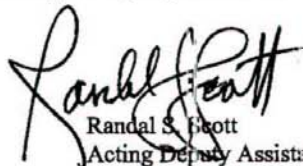
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- **ILAW Condition** - The review of the revised Hanford ILAW PA dated March 2001 closed the ILAW PA conditions contained in the November 4, 1999, disposal authorization statement. However, the LFRG review emphasized the importance of the glass waste form consistency in meeting your performance criteria established in the performance assessment. As a result of the need for short and long term waste form integrity it is imperative that appropriate and sufficient glass testing, including product consistency tests, be carried out prior to disposal to confirm that the assumptions used in the performance assessment are representative of the final waste form.
- **ERDF Condition** - On June 18, 2001, DOE approved the crosswalk for ERDF that demonstrates the Record of Decision for the ERDF is consistent with the DOE Order 435.1 requirements and granted disposal authorization to the ERDF, closing the condition.

Richland Operations Office is authorized to continue operations of the DOE Hanford Site 200 East Area Burial Grounds, the 200 West Area Burial Grounds and ERDF for low-level waste disposal subject to the CA conditions in the revised disposal authorization statement. Office of River Protection is authorized to continue development of the ILAW disposal facility subject to the CA conditions in the revised disposal authorization statement. Failure by the Hanford site to comply with these conditions should be reported by the Richland Operations Office and the Office of River Protection to Jay Rhoderick or William E. Murphie, LFRG Co-Chairs and based upon their recommendation to me, could result in the revoking of the authorization and the immediate shutdown of the disposal facilities. If your staff have any questions regarding the process for working with the LFRG on meeting the remaining conditions, they should contact Jay Rhoderick (301) 903-7211 or William Murphie at (301) 903-2328.



Randal S. Scott  
Acting Deputy Assistant Secretary  
for Project Completion  
Office of Environmental Management

Attachment

Disposal Authorization Statement  
for the  
Department of Energy Hanford Site  
Low-Level Radioactive Waste Disposal Facilities

Revision No.: 2

Effective Date: \_\_\_\_\_

**Background:**

The DOE Radioactive Waste Management Order requires that a disposal authorization statement be obtained prior to construction of a new low-level waste disposal facility. Field Elements with existing low-level waste disposal facilities shall obtain a disposal authorization statement in accordance with the schedule in the Complex-Wide Low-Level Waste Management Program Plan. The disposal authorization statement shall be issued based on a review of the facility's performance assessment and composite analysis or appropriate Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation. The disposal authorization statement shall specify the limits and conditions on construction, design, operations, and closure of the low-level waste facility based on these reviews. A disposal authorization statement is a part of the required radioactive waste management basis for a disposal facility. Failure to obtain a disposal authorization statement or Record of Decision shall result in shutdown of an operational disposal facility or disapproval to initiate construction of a new facility.

**Disposal Authorization Statement:**

In fulfillment of the requirements of DOE Radioactive Waste Management Order, this Disposal Authorization Statement is hereby issued authorizing the Hanford Site to transfer, receive, possess, and dispose of low-level radioactive waste at the 200 East Area burial grounds, the 200 West Area burial grounds, the Immobilized Low-Activity Tank Waste disposal facility and the Environmental Restoration Disposal Facility.

The Hanford Site shall conduct its low-level waste disposal program in accordance with the requirements contained in the following documents:

**200 East Area burial grounds**

Performance Assessment for the Disposal of Low-Level Waste in the 200 East Area Burial Grounds, WHC-EP-0645, November 1995, M.I. Wood, et al.

Letter from M.W. Frei to Charles Hansen, Conditional Acceptance of the Hanford 200 East Area Burial Ground Performance Assessment, June 30, 1997.

Addendum to the Performance Assessment Analysis for Low-Level Waste Disposal in the 200 East Area Active Burial Grounds, HNF-2005, Rev. 0, M.I. Wood, December 21, 1998.

#### **200 West Area burial grounds**

Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds, WHC-EP-0645, November 1995, M.I. Wood, et al.

Letter from S.P. Cowan to Charles Hansen, Conditional Acceptance of the Hanford 200 West Area Burial Ground Performance Assessment, June 30, 1996.

Addendum to the Performance Assessment Analysis for Low-Level Waste Disposal in the 200 West Area Active Burial Grounds, HNF-SD-WM-TI-798, Rev. 0, M.I. Wood, December 20, 1996.

#### **Immobilized Low-Activity Tank Waste Disposal Facility**

Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version, DOE/ORP-2000-24 Rev.b., F.M. Mann, et al., March 2001.

#### **Hanford Site**

Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site, PNNL-11800, March 1998, C.T. Kincaid, et al.

Letter from J. Fiore and M. Frei to Manager for Hanford Office of River Protection and Manager for Richland Operations Office dated September 1999, Subject: Conditional Acceptance of the Immobilized Low-Activity Tank Waste Disposal Facility Performance Assessment and Hanford Site 200 Plateau Composite Analysis.

This Disposal Authorization Statement is subject to all applicable rules and Orders now or hereafter in effect and to all conditions specified below. Also, this authorization is applicable to any subsequent revisions and additions to the performance assessments and the composite analysis provided such revisions and additions are in accordance with the performance assessment and composite analysis maintenance program. Applicable permits and reports that comprise the Radioactive Waste Management Basis shall be approved and continue to be maintained current according to the applicable DOE Orders and regulations.

#### **Facility Construction and Design**

The 200 East Area burial grounds consist of three types of earthen trenches described in the performance assessment: Category 1 trenches, Category 3 trenches, and trenches for Naval reactor components. The design features of each disposal unit constructed in the field shall conform to the conceptual model used in the performance assessment or special analysis. Any changes in disposal technology, disposal unit, or waste form must be analyzed and authorized

according to the performance assessment and composite analysis maintenance program and approved by DOE.

The 200 West Area burial grounds consists of two types of earthen trenches described in the performance assessment: Category 1 trenches and Category 3 trenches. The design features of each disposal unit constructed in the field shall conform to the conceptual model used in the performance assessment or special analysis. Any changes in disposal technology, disposal unit, or waste form must be analyzed and authorized according to the performance assessment and composite analysis maintenance program and approved by DOE.

A detailed design for the Immobilized Low-Activity Tank Waste disposal facility is not yet available. Since the 1998 Immobilized Low-Activity Tank Waste Performance Assessment, the design of the facility has been changed from underground concrete vaults to trenches. The current designs have the disposal facility as a series of large, covered trenches containing glass waste forms from the vitrification of low-activity waste from treatment of Hanford tank waste. This combination of disposal unit and waste form has been analyzed in the 2001 Hanford Immobilized Low-Activity Tank Waste performance assessment. The design features of each disposal unit constructed in the field shall conform to the design limits derived from the conceptual models used in the performance assessment or special analysis. Any changes in disposal technology, disposal unit or waste form must be analyzed according to the performance assessment and composite analysis maintenance program and approved by DOE.

#### **Radionuclide Limits, Waste Form, and Packaging**

Each disposal unit within the 200 East Area burial grounds, the 200 West Area burial grounds, and the Immobilized Low-Activity Tank Waste disposal facility shall have waste acceptance criteria which provide specific radionuclide disposal limits, waste form restrictions, and descriptions of acceptable waste packages. The waste acceptance criteria shall be based on facility performance assessments, special analyses, and composite analyses as well as safety documentation and criticality considerations. Waste acceptance procedures shall be in place that describe requirements for waste characterization, waste certification and record keeping, as well as the process for authorizing deviations from the requirements. All waste received for disposal at these facilities must conform to the waste acceptance procedures. The waste acceptance criteria shall be reviewed and approved through the facility Radioactive Waste Management Basis.

The Immobilized Low-Activity Tank Waste disposal facility glass waste form characteristics were important assumptions used in the performance assessment to demonstrate compliance with performance criteria. As a result of the need for short and long term waste form integrity it is imperative that appropriate and sufficient glass testing, including product consistency tests, be carried out prior to disposal to confirm that the assumptions used in the performance assessment are representative of the final waste form.

#### **Closure**

Closure plans for the 200 East Area burial grounds, the 200 West Area burial grounds have been written and approved by the Richland Operations Office on November 16, 2000. The Closure

Plan for the Immobilized Low-Activity Tank Waste disposal facility has been written and approved by the Office of River Protection on September 22, 2000. These closure plans addressed any outstanding closure commitments from the review of the 200 East Area Burial Grounds, the 200 West Area Burial Grounds, and the Immobilized Low-Activity Tank Waste Disposal Facility performance assessments and the composite analysis. Any deviations in the closure plan from the closure concept analyzed in the performance assessments must be analyzed and approved per the performance assessment and composite analysis maintenance program.

#### **Monitoring**

Monitoring plans for the 200 East Area burial grounds and the 200 West Area burial grounds have been written and approved by the Richland Operations Office on November 15, 2000. The monitoring plan for the Immobilized Low-Activity Tank Waste disposal facility has been written and approved by the Office of River Protection on November 1, 2000. These plans shall be updated at least every five years to reflect changing facility conditions. The plans shall include monitoring frequencies and protocols for all the data collection required to assess the continued performance of the disposal facilities. These plans shall also include a requirement for comparison with the performance assessment results and development of any corrective action necessary.

#### **Performance Assessment and Composite Analysis Maintenance**

Maintenance plans for the 200 East Area burial grounds, and the 200 West Area burial grounds have been written and approved by the Richland Operations Office on March 22, 2000. The Maintenance plan for the Immobilized Low-Activity Tank Waste disposal facility has been written and approved by the Office of River Protection on March 22, 2000. Changes in the disposal facility operation (e.g., waste form, disposal unit design, radionuclide quantity) or in site policy (e.g., land use plan) or strategy (e.g., closure plans, remedial actions) and consequent changes in disposal facility controls shall be managed per the performance assessment and composite analysis maintenance program.

Copies of the annual review of the adequacy of the performance assessments and the composite analysis shall be provided to the Low-Level Waste Disposal Facility Federal Review Group (LFRG).

#### **200 East Area Burial Grounds and 200 West Area Burial Grounds Performance Assessment Conditions**

There are no outstanding conditions.

#### **Environmental Restoration Disposal Facility Condition**

There are no outstanding conditions.

**Immobilized Low-Activity Tank Waste Disposal Facility Performance Assessment Conditions**

There are no outstanding conditions.

The secondary issues identified in the Hanford review team report shall be addressed in future updates to the performance assessment as part of normal performance assessment maintenance.

**Hanford Site Composite Analysis Conditions**

Continue the strategy to include the Gable Mountain Pond within the 200 Area buffer zone and integrate with Hanford's land use planning documentation.

As agreed provide to the LFRG, by September 30, 2001, an addendum to the composite analysis that addresses the following:

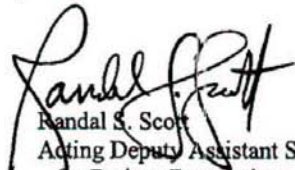
Bounding sensitivity analyses of the impact on the composite analysis results of the PUREX tunnels, the chemical separations plants, and the CERCLA sites in the 200 Area.

The secondary issues identified in the Hanford review team report shall be addressed as the composite analysis is maintained. Also, the following secondary issue, identified during the August 16-17, 1999, LFRG meeting shall be addressed as the composite analysis is maintained:

Provide justification for the assumption that the basalt aquifers and interbeds do not contain significant contaminants.

**Violations of Operational Requirements**

Performance assessment and composite analysis commitments that are not met will result in the review of the applicability of continued disposal authorization.



Randal S. Scott  
Acting Deputy Assistant Secretary  
for Project Completion  
Office of Environmental Management

**Compliance Evaluation of the Performance Assessments and the Composite Analysis for the Disposal of Low-Level Waste in the Hanford Low-Level Waste Disposal Facilities**

The Low Level Waste Disposal Facility Federal Review Group (LFRG) concludes that the performance assessment and the composite analysis were found generally acceptable and it was determined that continued waste management operations be approved with specific conditions as delineated in the disposal authorization statement. The LFRG reviewed the following documents to make this determination:

- Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version, DOE/ORP-2000-24 Rev.b., F.M. Mann, et al., March 2001.
- Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds, WHC-EP-0645, November 1995, M.I. Wood, et al., and the Addendum to the Performance Assessment Analysis for Low-Level Waste Disposal in the 200 West Area Active Burial Grounds, HNF-SD-WM-TI-798, Rev. 0, M.I. Wood, December 20, 1996.
- Performance Assessment for the Disposal of Low-Level Waste in the 200 East Area Burial Grounds, WHC-EP-0645, November 1995, M.I. Wood, et al. and the Addendum to the Performance Assessment Analysis for Low-Level Waste Disposal in the 200 East Area Active Burial Grounds, HNF-2005, Rev. 0, M.I. Wood, December 21, 1998.
- Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site, PNNL-11800, March 1998, C.T. Kincaid, et al.
- Review Team Reports.

On August 16, 1999, the performance assessment for the Immobilized Low-Activity Tank Waste disposal facility was conditionally approved and the 200 area plateau composite analysis was accepted with conditions. On September 28, 2001, a revised performance assessment for the Immobilized Low-Activity Tank Waste disposal facility was conditionally approved. There are no outstanding conditions.

The performance assessments for the 200 East and West area burial grounds were conditionally accepted on June 30, 1997 and June 27, 1996, respectively. The performance assessments were judged to provide a reasonable expectation that the DOE Order 5820.2A and DOE Order 435.1 performance objectives would not be exceeded. The LFRG concluded that the composite analysis provided sufficient information to determine that the Hanford low-level waste disposal facilities' operations would not contribute significantly to any composite effects. Therefore, if any adverse exposure concerns resulted, management alternatives should be directed at other sites or sources of radioactive contamination. There are no outstanding conditions for the 200 East Area burial grounds and 200 West Area burial grounds performance assessment. The Richland Operations Office completed and documented a review of the adequacy of waste characterization relative to the data needs of the 200 East Area burial grounds and 200 West Area burial grounds performance assessments. DOE agreed that this condition was met on October 3, 2000.

On July 17, 2000, Richland Operations Office provided a memorandum confirming that the status of the 200 East Area burial grounds and 200 West Area burial grounds have not changed since approval of the performance assessment. DOE agreed that this condition was met on October 3, 2000.

The review by LFRG completes the approval of the composite analysis for Environmental Restoration Disposal Facility. To ensure consistency between the Record of Decision and the DOE Order 435.1 requirements, the Richland Operations Office provided to the Office of Project Completion, a crosswalk demonstrating that the substantive requirements of DOE Order 435.1 have been fulfilled. DOE approved the crosswalk on June 18, 2001, finding that the crosswalk does demonstrate compliance with DOE Order 435.1 and granted disposal authorization to the Environmental Restoration Disposal Facility.

The base case analysis results in the following calculated doses relative to the performance measures:

Performance Assessment for the Immobilized Low-Activity Tank Waste Disposal Facility

PA Component	Measure	Immobilized Low-Activity Tank Waste Disposal Facility Projected Maximum Dose or flux
All pathways	$\leq 25$ mrem/yr	0.070 mrem/yr
Air pathway	$\leq 10$ mrem/yr	$<10^{-5}$ mrem/yr
Radon flux	an average flux of $\leq 20$ pCi/m <sup>2</sup> /s  or  an air concentration of $\leq 0.5$ pCi/L unless constrained by applicable laws and regulations, or agreements	$<0.001$ pCi/m <sup>2</sup> /s
Hypothetical inadvertent intruder	100 mrem/yr from chronic exposure  500 mrem/yr from a single event	10.2 mrem/yr from chronic exposure  0.76 mrem/yr from a single event
Water resource protection	Established consistent with laws, agreements or groundwater protection management program  Hanford adopted the following performance measures for groundwater protection: Beta/photon emitters: 4 mrem/yr Alpha emitters: 15 pCi/L Radon: 3 pCi/L	0.0102 mrem/yr 0.034 pCi/L $<0.001$ pCi/L

Sensitivity/uncertainty analyses were conducted by identifying the modeling parameters to which the results were most sensitive, then evaluating the impacts by using higher and lower input values than those used for the base case. The results of the sensitivity/uncertainty analysis show that performance objectives could be exceeded if the long-term release rate from the glass waste form is significantly larger than the rate used in the base case, if the infiltration rate is high and the disposal facility/closure design does not incorporate a sand-gravel diverter, or if the inventory of key radionuclides (i.e., selenium, technetium, or uranium) were significantly larger. These results are judged to be consistent with a reasonable expectation that the performance target for protecting groundwater will be met.

#### Performance Assessment for the 200 East Area Burial Grounds

PA Component	Measure	200 East Area Burial Grounds Projected Maximum Dose or flux*
All pathways	$\leq 25$ mrem/yr	0.02 mrem/yr
Air pathway	$\leq 10$ mrem/yr	$< 0.0002$ mrem/yr
Radon flux	an average flux of $\leq 20$ pCi/m <sup>2</sup> /s  or  an air concentration of $\leq 0.5$ pCi/L unless constrained by applicable laws and regulations, or agreements	0.0002 pCi/m <sup>2</sup> /s
Hypothetical inadvertent intruder	100 mrem/yr from chronic exposure  500 mrem/yr from a single event	0.02 mrem/yr from chronic exposure  < chronic exposure
Water resource protection	Established consistent with laws, agreements or groundwater protection management program  Hanford established a performance measure of 4 mrem/year	0.02 mrem/yr

\* Maximum doses during the 1000 year compliance period are not reported, therefore, the reported peak doses which occur beyond 1000 years are used to evaluate compliance.

Sensitivity/uncertainty analyses show that the values of parameters used in the base case, and the results of the base case are in the conservative portions of their respective ranges. This supports the premise that the analyses are conservative and that the performance objectives can reasonably be expected to be met.

Performance Assessment for the 200 West Area Burial Grounds

PA Component	Measure	200 West Area Burial Grounds Projected Maximum Dose or flux*
All pathways	$\leq 25$ mrem/yr	0.47 mrem/yr
Air pathway	$\leq 10$ mrem/yr	0.012 mrem/yr
Radon flux	an average flux of $\leq 20$ pCi/m <sup>2</sup> /s  or  an air concentration of $\leq 0.5$ pCi/L unless constrained by applicable laws and regulations, or agreements	0.15 pCi/m <sup>2</sup> /s
Hypothetical inadvertent intruder	100 mrem/yr from chronic exposure  500 mrem/yr from a single event	44 mrem/yr from chronic exposure  < chronic exposure
Water resource protection	Established consistent with laws, agreements or groundwater protection management program  Hanford established a performance measure of 4 mrem/year	0.35 mrem/yr

\* Maximum doses during the 1000 year compliance period are not reported, therefore, the reported peak doses which occur beyond 1000 years are used to evaluate compliance.

Sensitivity/uncertainty analyses show that the values of parameters used in the base case, and the results of the base case are in the conservative portions of their respective ranges. This supports the premise that the analyses are conservative and that the performance objectives can reasonably be expected to be met.

Composite Analysis, Hanford 200 Area Plateau

Composite Analysis Component	Measure	Hanford 200 Area Plateau Projected Maximum Dose
All pathways	Composite Analysis dose constraint of 30 mrem/yr	<6 mrem/yr

Sensitivity analysis show that the values of parameters used in the base case and the results of the base case are in the conservative portions of their respective ranges. This supports the premise that the performance measure can reasonably be expected to be met.

LFRG Co-Chairs:

  
Jay E. Rhoderick, Co-Chair

  
William E. Murphie, Co-Chair

Date: 10/11/01